

Jerusalem, Israel, May 30-June 2, 2010

Title: COMPARISON OF BLOOD ALCOHOL LEVELS WITH BREATH ALCOHOL LEVELS MEASURED USING THE DRAGER 7110 MKIII BREATHALYZER

Presenting Author: Kobi Peleg

Authors: K. Peleg 1,2;D. H. Jaffe 1;M. Siman-Tov 1;S. Almog 3;D. Shinar 4;

Affiliation

1. Israel National Center for Trauma and Emergency Medicine, Gertner Institute for Epidemiology and Public Health Policy, Tel-Hashomer, Israel, 2. Department of Disaster Management, School of Public Health, Tel Aviv University, Tel Aviv, Israel, 3. The Institute of Clinical Toxicology and Pharmacology, Tel-Hashomer, Israel, 4. Israel National Road Safety Authority, Jerusalem, Israel,

Abstract:

Background: Over the past century the breathalyzer has become an indispensable tool for identifying alcohol levels among drivers. This instrument measures breath alcohol concentrations and is correlated with blood alcohol levels at a 2100:1 partition ratio. Recent uncertainty with this association has resulted in a legal standstill in the conviction of drunk drivers.

Objective: The study objective was to assess the correlation between breath alcohol, as measured using the Drager 7110 MKIII breathalyzer, and blood alcohol concentrations (BAC).

Methods: A blinded study was performed using conditions that were as similar as possible to those in the field. The study took place on the Sheba Hospital campus on 28/7/2008. Sixty-one healthy men and women between the ages 21-37 years participated in this study. The study was performed in four sets throughout the day each set comprising between 13-16 volunteers. Participants were administered between 0.89-1.16 g alcohol/kg bodyweight according to sex of 95% alcohol mixed in juice. Blood and breath alcohol measurements were performed prior alcohol ingestion and served as a control measure for each person. Three additional sets of breath/blood measures were performed approximately 20-30 minutes after alcohol ingestion with 20-30 minute intervals between tests. Blood and breath measures were taken as near to simultaneous as possible by police officers trained in the use of the breathalyzer. Blood samples were taken by study personnel to the laboratory for toxicology at Sheba Hospital for analysis. All blood and breath measurements were coded and researchers were blinded to the administered alcohol concentration or test times. Pearson correlations were used to assess the degree of association and sensitivity and specificity were measured.

Results: A total of 242 valid blood/breath tests were performed on 61 participants. The correlation coefficient between breath and blood alcohol levels was high ($r=0.983$). The regression equation for the prediction of breath alcohol was equal to $10.224 + 4.292 \cdot \text{blood alcohol}$. Sensitivity of the breathalyzer instrument was 97% and specificity was 93%.

Conclusions: Using field conditions we showed a high correlation between the Drager 7110 MKIII breathalyzer and BAC. The results of this study were used in the courts as evidence for the strong association between BAC and breath alcohol levels.